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A Review Paper on Agile Project Management and Automation System in Software Development

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ABSTRACT
The Agile Software Development Manifesto prioritizes people and relationships over procedures and equipment. However, managers can more effectively track the development of software projects by using software tools. An analysis of agile project management tools is presented in this report. This study on automation in agile projects could be beneficial to project managers. In the modern IT world, efficient software project management is typically the most crucial component in the success of numerous businesses, as well as their managers and engineers. Software managers oversee, direct, and oversee numerous projects at once. Agile project management insights are offered by the study. In order to comprehend the supported features that could affect their choice, the goal is to investigate and identify the top Agile project management solutions utilized by software project management teams and their managers. This paper examines a case study of a software project that automated software agile projects through the use of several software agile project management technologies. Automation of project planning, scheduling, and estimating can not only improve project success rates but also save project costs, completion times, and resource requirements. Agile project automation improves the likelihood that a project will be completed on time. Ultimately, the sum of these factors raises the software project success rate.

Keywords: *information technology, Software Development, **a**gile*

I. INTRODUCTION

In today's IT world Agile software development methodology is very popular in software industries, as software products are intangible, changes evolves many times during the project lifecycle. Dynamic requirements of customers is a big challenge for the project managers and developers, and solution for this challenge is agile development methodology. Changes in the requirements affects on cost, time and risk factors of the project. To make such agile project successful proper and effective software project management is usually the most important. Software managers have to monitor, control and manage many projects concurrently. Unfortunately, today we can see some projects were completed successfully but some were not completed on time, over budgeted or being cancelled. There are many reasons behind the failure of software projects, like lack of planning, incomplete requirements, change in customer requirements, lack of resources, incorrect cost estimation, just to name a few.

This paper represents how automation of different processes of project helps project team to make agile project successful. The aim is to explore different areas for the automation in agile projects which will decrease the project cost, project time and resources required for completion of project and will increase the reliability of project where project will complete on schedule.

II. THE AGILE MANIFESTO

The "Agile Manifesto" provides a good overview of the intent of Agile Methods. "We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value. Agile methodologies follows these principles:

1. Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.
2. Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.

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3. Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.
4. Business people and developers must work together daily throughout the project.
5. Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.
6. The most efficient and effective method of conveying information to and within a development team is face-to- face conversation.
7. Working software is the primary measure of progress.
8. Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
9. Continuous attention to technical excellence and good design enhances agility.
10. Simplicity--the art of maximizing the amount of work not done--is essential.
11. The best architectures, requirements, and designs emerge from self-organizing teams.
12. At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

III. AGILE METHODOLOGY

Software companies following agile development methodology which helps their team to reduce risks and to mitigate uncertainty, also it decreases the project time, cost and delivers high quality product to the customer. Agile methodology used for the project whose requirements vary during project lifecycle.

Agile methods generally promote a disciplined project management process that encourages frequent inspection and adaptation, a leadership philosophy that encourages teamwork, self-organization and accountability, a set of engineering best practices that allow for rapid delivery of high-quality software, and a business approach that aligns development with customer needs and company goals.

Agile methodology is most popular methodology for software development in software industries because of the following features:

i. Ready to adapt expected changes required by Customers at any time during product lifecycle.
ii. It helps teams embrace rapid changes & increase adaptability with customers easily.
iii. It helps teams to mitigate risks at early stages of product life-cycle.
iv. Customers can see the visible progress of software as they are able feel of working software.
v. Customers are part of the product development, they can give feedback at every stage of the product life cycle.
vi. It focuses on shortening timeframe and cost and on improved quality of product.
vii. Complexity of the features are properly prioritized and easily managed by the team.
viii. Team has chance to learn from mistakes during and after each iteration of development.

For all the above reasons IT teams are embracing Agile Methodologies and develop new rapidly changing products.

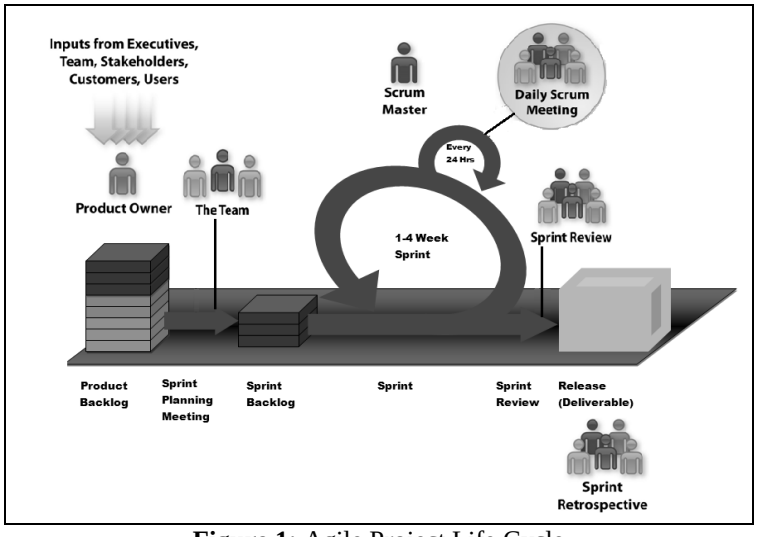

Figure 1: Agile Project Life Cycle

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The Different methodologies of Agile Development are as follows:

a. XP

Extreme Programming (XP) is one of the most widely used agile methodologies. The XP focuses & improves a software project in four essential ways which are communication, simplicity, feedback and courage. It is introduced many best practices with which XP programmers are able to courageously respond to changing requirements and technology.

In XP, there is an emphasis on priority of customer/client stories which represent the business requirements for each system release. The XP approach divides project into small releases as per customer requirements and system functionality/features with developers writing the tests for system functionality/features before actually writing the specific code. The involvement of the customer from the inception of the project through the Customer/Client acceptance testing before production release of code ensures strong buy in the Customer/client. In XP, there is a strong emphasis on the team and collaborative development. In this approach, there is knowledge transfer between the customer and developers very much in line with the RAD approach.

b. Scrum

Scrum is an agile, iterative, incremental developing method which assumes that changes exists through entire life-circle of the project and attempt to solve these problems. Scrum is designed in such way that it helps teams embrace rapid changes & increase adaptability with customers easily.

In Scrum, work is structured in releases and releases into cycles of work called sprints, iterations of work that are typically two to four weeks in duration. During each sprint, teams creates set of tasks for a prioritized list of customer requirements, called user stories , so that the features that are developed first are of the highest value to the customer. At the end of each sprint developed product is delivered to the customer for reviewing. naturally focuses an entire organization on building successful products. Scrum can be implemented at the beginning of a project or in the middle of a project or product development.

c. DSDM

DSDM (Dynamic Systems Development Method) is a robust Agile project management and delivery framework that delivers the right solution at the right time. DSDM is an organized, common-sense process focused on delivering business solutions quickly and efficiently. It is similar in many ways to SCRUM and XP, but it has its best uses where the time requirement is fixed.

Requirements are base lined at a high level early in the project. Rework is built into the process, and all development changes must be reversible. Requirements are planned and delivered in short, fixed-length time-boxes, also referred to as iterations. Requirements are prioritized on the basis of MoSCoW rules.

All critical work must be completed in a DSDM project. It is also important that not every requirement in a project or time-box is considered critical. Within each time-box, less critical items are included so that if necessary, they can be removed to keep from impacting higher priority requirements on the schedule. DSDM is designed to be easily tailored and used in conjunction with traditional methods or to complement other Agile approaches.

IV. AUTOMATION

Automation means handling certain repetitive, mundane or routine project tasks, activities using software or tools instead of doing it manually. These are tasks that might take quite some time for a person to accomplish, or might be tedious. Rather than have a person work on such tasks that can be handled by software or tools, put that person to work on more specialized tasks that better utilize her or his skills.

Why to Automate Agile Project?

Have you ever felt that your project management processes and methodology can add to project overhead, delays and cost overrun if not implemented properly? What if it could all be reduced without compromising the effectiveness of the process or methodology?

Today we can see that there are different project management methodologies are implemented manually using myriads of documents. Doing any processes manually often carry big administrative overhead. In companies we see that managers has to work on multiple projects or portfolios and it is difficult to them to monitor status, budget and resources of each project because all that information is hidden inside myriads of documents. It is difficult and time consuming for managers to open each documents to get details of each project and also it is not possible to have daily meeting with each project team. Poor management affects on work efficiency, communication between team members. This results to Budget over run, Time delay, Inefficient utilization of resources, Poor quality of work /product and finally it leads to project failure.

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V. DIFFERENT CHALLENGES IN AGILE PROJECTS

Agile projects has different challenging processes which affects on success of the project .

A. Project Management

Project Management involves planning, monitoring, tracking, staffing and directing. During Agile project development managers and project team need to know about product backlogs, sprint backlogs, tasks, schedule, risks, issues, resources, lessons, deliverables etc. Managers have to track all these elements and direct to the project team. But most of the time it is seen that all these elements are done in unstructured text format in some doc files, where everybody need to manually update this information and present it to all. It is difficult to track, difficult to present it to all and time consuming, so it is required to present in easy to read tables, graphs and diagrams format and should be easy to deliver everybody.

But during such important information flow one more concept comes into picture i.e. Customization as per roles & responsibilities. In Agile we have different roles like product owner, Scrum master, Team member so visibility of information should be as per role of the person. And everybody can generate or get automated report.

B. Knowledge Management

Knowledge management (KM) is the process of capturing, developing, sharing, and effectively using organizational knowledge. In organization managers or team members works in different projects so it might possible that different terminologies, processes, methodologies and templates used in different projects or even sometimes within same project. Hence it is critical to get clear idea, information of project e.g. User Stories of the project . Managers and team members have to invest hours into reinventing wheel on what information to include, which processes should be implemented, and what template to use to present information, but standardization reduces this overhead. Standardization can be possible through automation, by using different software, tools and templates we can capture and present relevant information to all stakeholders of project.

C. Testing

Testing is the process by which we check whether developed product is fulfilling customer requirements, product is working properly or not. Testing is the biggest challenge of agile projects. As in agile projects customer requirements varies during product development cycle, it is very difficult to test product completely. Whenever requirement changes and developed by developer, tester have to test it from beginning or have to test all modules of product. It is very time consuming, many times agile projects are get failed due to poor testing or delay due to testing. So it is require to automate testing process of the project. For all these challenges solution is Automation. All these project processes should be centrally maintained and automated.

VI. AGILE PROJECT AUTOMATION

Agile project automation involves an automation of different processes of agile projects. As we discussed above about different challenging processes of agile project, automation is solution for all these problems. To resolve these problems there are different automation software, tools are available in market. Many tools are free open source and some tools are payable. By using such tools we can reduce the time, cost, resources and efforts required for successful execution of the project.

Now will see how automation will helps to reduce all overheads of these challenging processes

A. Project Management Automation

Agile Project management involves planning, monitoring, tracking, staffing and directing of different agile project elements like product backlogs, sprint backlogs, tasks, schedule, risks, issues, resources, lessons, deliverables etc. For agile project management there are different tools are available in market. We can use any one tool for automation of agile project management process as per the project agile methodology. These tools has different features which helps project managers and project team during project development lifecycle to get status of different elements of the project. These tools represent the data in the form of different charts and table which are easy to understand to everyone.

Some major features of Agile Project Management tools:

Portfolio Management: Helps managers to get status of different projects

Project, Release & Sprint Management: Helps to define Projects their releases, sprints in hierarchical way

Kanban Structure: Helps to get status of different tasks of the project sprints.

Task Management: It helps to allocate resource and estimate the time required for the task execution.

Burndown Chart: Helps to get idea about velocity of project work & to predict product delivery date.

Risk Management: Helps to get information about the different risks, issues and problems present in the project also describe different action taken or to be done on the risk.

User & Role Management: Helps to add different users and assign roles responsibilities to them. Some tools are very flexible in role creation.

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Such different features of project management tools helps project managers and team to monitor status of project and it's different elements.

B. Knowledge Management Automation

In agile projects customers requirements are accepted during project /product development lifecycle and we conduct different meetings for prioritization these requirements . We create user stories for all these customers requirement, so it is important that every stakeholder of project should know clear idea about each requirement. To make such crucial information available to each stakeholder need to use some software, tool which will helps to develop and share information to everyone as per their role in the project. Sharing of knowledge information helps to improves the decision making of the project team and which reduces the conflict, risks, problem occurs during project development. There are different Knowledge management and Wiki tools available in market we can use it.

Create: Helps to create text, tables, links, wiki pages
Sharing: Helps to Share documents, tables, links, images, wiki pages etc.
User Management: Helps to add users and assign different role
Access Management: Helps to assign different access levels as per role. Access levels are like None, Read Only, Read & Edit, Read-Edit-Create, Read-Edit-Create-Delete
Email Notification: Helps to notify stakeholders about any updation .i.e. modification done in any document using Email.
These different features helps to make relevant information visible to project stakeholders as per their role.

C. Testing Automation

In software testing automation we use special software (separate from the software being tested) to control the execution of tests and the comparison of actual outcomes with predicted outcomes. In agile projects we deliver products to the customer in very short period of time, so we get less time for testing and as it has dynamics requirements if we make changes in one module of code then we need to retest the complete product to check whether changes in one file affected on another file or not and it is a big challenge for testing team.

The solution for this challenge is test automation, by using testing automation tool we can automate test cases i.e. we can create test scripts for test cases or test set. Automation testing tools helps to create, record, store and execute these scripts. But test automation is more than test execution, some tools also generates test reports and sends email reports of test execution to the tester. Testing Automation tools contain following major features/ functionalities

Create: Helps to create test scripts for test cases.
Record & Store: To record and save test scripts for retesting.
Play (Execute): To execute test cases using stored test scripts, mostly useful for regression testing.
Report: Generates reports of the executed test cases and send it to the tester.

VII. BENEFITS OF AGILE PROJECT AUTOMATION

Following are the benefits of automation of agile project processes

A. Benefits of Agile Project Management Automation:

- It helped management team for monitoring and tracking project activities.
- Helped in Risk Management of project.
- Useful for manager in work allocation.
- Useful in time estimation to decide delivery date of product.
- Useful to decide priority of task and track prioritized tasks.
- Process and practices gaps analyzes.
- Backlog in boards and index cards from different perspectives.
- Plan multiple releases and sprints.
- Capacity and velocity metrics for accurate planning.
- Progress tracked on Kanban boards, in burndown and burn up charts.

B. Benefits of Knowledge Management Automation:

- It becomes easy to share information
- Information stored in unique format which helped to easy to understand.
- Every time it helped in decision making for whole team.
- Easy to get updates of client requirements and their changes.
- Reduced the conflicts which occurs in project work due to communication gap.

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C. Benefits of Testing Automation:

- Reduced testing time
- Reduced testing cost
- Frequent regression testing
- Rapid feedback to developers
- Virtually unlimited iterations of test case execution
- Support for Agile and extreme development methodologies
- Disciplined documentation of test cases
- Customized defect reporting
- Finding defects missed by manual testing
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VIII. CONCLUSION

Quick Project automation aids in cutting down on the amount of money, time, and effort needed to complete the project. Automation of project management can improve quality control, streamline development schedules, and save a significant amount of money. Automation speeds up project work, conserves resources, and enhances the caliber of project management. Automation in project management and knowledge management facilitates better decision-making for both the technical and management teams. It speeds up and enhances decision-making, makes it easier to track project-related activities at any time and from any location. Automation of testing processes saves time and effort in project testing, facilitating on-time product delivery. Thus, automating certain agile project procedures improves the likelihood of completing the project effectively, on schedule, under budget, and with high quality.

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